

JFSP ANNUAL REPORT

PROJECT 10-1-06-1 -- Fire and foraging habitat quality for endangered bats in Kentucky's Mammoth Cave National Park

PERSONNEL

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SUMMARY

Sampling Scheme

The growing season of 2010 was the first field season for this project. The JFSP proposal provides justification and review of the background and experimental design. Sampling transects were established for light traps and malaise traps alongside Anabat detectors. Light traps and malaise traps sample insect populations while Anabat detectors sample bat activity. Transect locations were selected along upland and mid-slope habitats using a stratified-random design; paired transects were established for burned and adjacent unburned land parcels (Figure 1). These paired transects were replicated across three study blocks for field efforts in 2010: Chaumont, Floating Mill, and Joppa Church.

Fire behavior mapping

During spring 2010, in conjunction with the CONSUME fuel consumption project (08-1-6-01), fire behavior was mapped in the Floating Mill and Joppa Church units that were sampled for insects and bats in the present study (see below). Heat release from fires was mapped using the WASP (Wildfire Airborne Sensor Package) system in conjunction with ground sampling (Figure 2). Fires burned through a mosaic of forest including ice storm disturbance (Figure 3).

Forest structure mapping

In early October, during the swarming period, Earth Eye Inc., on contract with the Northern Research Station used a waveform LiDAR mapping system to collect forest structural information over the entire Mammoth Cave National Park. Those data, recently delivered, will be reduced and analyzed to produce maps of 3-D forest structure that will be related to insect populations and bat activity.

Prey Assessments

Three rounds of sampling along light and malaise trap transects were conducted at each study block from August 5th through October 5th, yielding ca. 54 trap / nights per trapping method. Though processing of malaise trap samples has not commenced, insects captured in light traps have been identified; analysis regarding effect of prescribed burning is ongoing.

Trapping grids (n = 30 traps across Floating Mill and Joppa Church study blocks) were established for funnel traps immediately after prescribed burns took place in April. These traps were visited bi-weekly and insects were collected through the end of field sampling; processing and identification of samples has not commenced.

Predator Assessments

Acoustic surveys using Anabat detectors were conducted on six nights out of every week during the field season (53 nights) from Aug 5th through October 7th, thus yielding 324 survey/nights. These acoustic data have been processed. Of the 123,184 acoustic files recorded, 11,121 files contained echolocation calls. Activity parameters (number of echolocation pulses, number of

files / night) have been extracted from these data; analysis regarding effect of prescribed burning is ongoing.

In collaboration with personnel at MCNP, emergence counts were conducted at the portals of three primary hibernacula (Colossal Cave, Dixon Cave, and Long Cave) using night-vision equipment. Each portal was visited twice, thus providing baseline population data for the Fall swarming period. Bats exiting and entering the portal were noted, and general observations were made regarding swarming.

Vegetation Assessments

General habitat data was collected at all sample points for insect traps and Anabat detectors: aspect, basal area, dominant vegetation, elevation, and slope position. Additionally, hemispherical photographs of the forest canopy were taken at each sample point.

Fixed-radius plots were also established at transect points for insect traps and Anabat detectors to assess woody vegetation. Measurements of vegetation and plot data followed the Common Stand Exam protocols of the USDA Forest Service's Natural Resource Information System (NRIS): Field Sampled Vegetation Module (FSVeg) (2003). Larger plots (0.04 ha) were considered at 26 transect points; smaller subplots (0.004 ha and 0.0004 ha) were considered at 36 transect points.

Vegetation data and forest cover information derived from the hemispherical photos will be used to validate and calibrate forest structural indices derived from the LiDAR dataset.

FIGURES

Figure 1. Generalized illustration of transect layout. Only the burn unit is depicted, but note that this layout mirrors sampling conducted in unburned units.

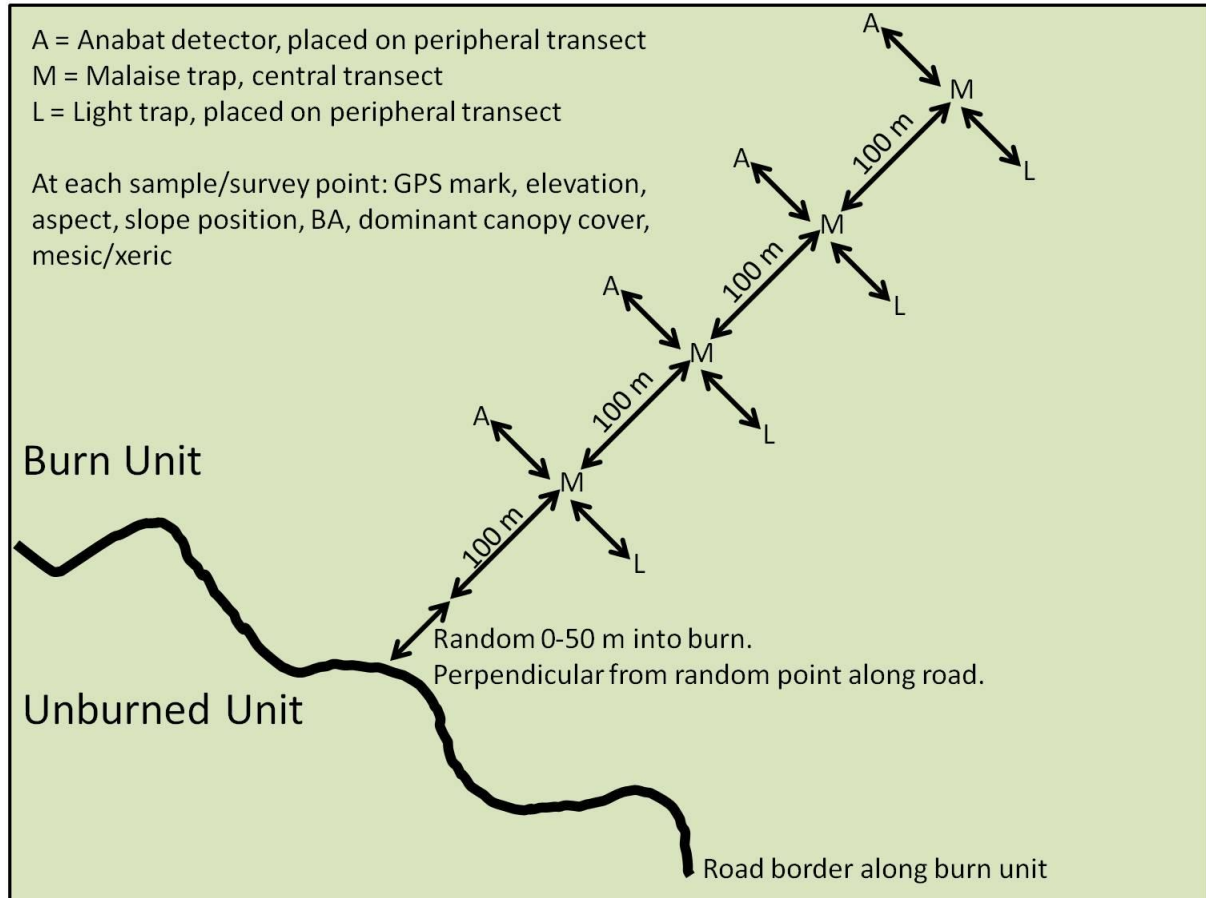


Figure 2. Fire monitoring ground sampling station used to calibrate and validate aerial heat release mapping.



Figure 3. Mixed hardwood and pine forest characteristic of many upland areas within the Mammoth Cave National Park. Ignition of the Joppa Church and Floating Mill units was accomplished by a combination of hand and helicopter ignition.

